

MODULE 3: ASSESSING THE COSTS AND COST SAVINGS OF THE INNOVATION

This module assists practitioners in determining the costs and cost savings associated with an innovation. Many innovations are aimed at improving resource efficiency for the regulator or regulated community so that scarce resources may be re-allocated to other environmental priorities. For example, if a permit streamlining innovation results in less permit review time by personnel within the regulatory agency, these full-time employees (FTEs) may now address other important problems. In addition to calculating resource efficiencies, it may be possible with some innovations to conduct a cost-effectiveness analysis with the goal of minimizing the costs of achieving particular policy goals. For example, if an innovation results in reducing the compliance costs per ton of pollutant, the innovation is more cost effective than the traditional way of doing business. In most cases, the innovation team will not have the resources to conduct formal cost-benefit or economic analyses, nor are such analyses appropriate in all cases.² This module helps assess if the innovation is more cost-effective than standard practice and assists in identifying ways in which the innovation can be more efficient. This module does not address assessing the costs and benefits of ecological or environmental attributes (e.g., economic value of a wetlands or health benefits).

Costs and cost-savings should be addressed in all three phases of the innovation.

Design Phase

The innovation practitioner should design the innovation to ensure that information is collected on the expected cost-savings and costs of the innovation. It is important at this phase to collect and assess the baseline costs before the innovation is applied. For example, attempt to quantify FTEs, budget, time, etc. instead of the traditional way of doing business of a traditional permitting system. If the innovation is a streamlined facility-wide permit, the design of the innovation should include an estimation of the expected cost-savings (time, money, FTE, etc.) and methods to collect this data so that the cost-savings can be compared to the traditional costs to demonstrate a relative cost advantage of the innovation.

Implementation Phase

The innovation practitioner should be tracking information on the cost-savings and costs of the innovation. Often, there are higher transaction costs associated with the initial implementation of innovations. The practitioner should anticipate these costs, but also track costs to see if those costs decrease with time over the life of the innovation, and that expected cost-savings projected in the design phase are being realized. Most importantly, cost and cost savings information is needed in order to help determine if there needs to be a mid-course correction of the innovation and if the innovation can eventually be transferable.

End of the Innovation Phase

Depending on the type of innovation, the innovation practitioner may want to consider if a full cost-benefit analysis is needed or warranted. For more information on economic analyses, please see EPA's *Guidelines for Preparing Economic Analyses*

(<http://yosemite.epa.gov/ee/epa/eed.nsf/Webpages/Guidelines.html>). For this module, focus on whether or not the innovation poses a relative cost-savings advantage over the traditional way of environmental protection. Costs and cost-savings do not have to be limited to transaction costs and cost savings, but can also include the amount of job creation, cost savings incurred by faster time to market, property redevelopment benefits, etc.

² For more information on complete cost-benefit assessments and on preparing economic analyses, please see EPA's National Center for Environmental Economics website.
<http://yosemite.epa.gov/ee/epa/eed.nsf/Webpages/Guidelines.html>

Formal Evaluation

A cost and cost-savings evaluation addresses how much the innovation or innovation components cost, preferably in relation to alternative uses of the same resources and to the benefits being produced by the innovation. The cost evaluation will include a description of the costs and savings associated with the innovation as well as an analysis of the efficiency, productivity and cost-effectiveness of the evaluation. The evaluation will focus on the “how and why” resources invested achieved the intended outcomes. The practitioner may decide that a formal cost-benefit analysis is needed outside of a cost-evaluation.

I. Measuring the Costs and Cost Savings of the Innovation

Quantifying the costs and cost savings associated with the innovation may require the innovation practitioner to use data sources from different organizations (i.e., regulated entity, governmental body, or other stakeholder group). Cost estimates will likely involve assumptions or uncertainties that will need to be identified and acknowledged, particularly at the time when transferability of the innovation is being considered.

Measurement Approach. In most instances, the innovator can use a simple direct compliance cost method to analyze costs and cost savings. This approach involves quantifying the compliance costs/cost savings realized or incurred by organization(s) implementing the innovation. The costs may include the capital costs associated with new technologies; the costs of operating and maintaining that new equipment; the costs of modifying operations to comply with the innovation; and the costs of complying with the innovation’s monitoring, record keeping, and reporting requirements. In addition, the analysis can quantify the costs that state regulatory authorities and EPA will incur in administering the innovation. Analysis of these costs is often likely to provide a reasonable approximation of the total social costs of the innovation. A similar analysis can be performed for the cost savings of the innovation.



Tip: The innovator should distinguish between start-up costs and ongoing implementation costs of the innovation.

Baseline Analysis. Similar to the analysis undertaken to determine environmental results in Module 2, the innovation practitioner must also characterize baseline cost conditions to determine the net change in costs. Without a baseline, there is no frame of reference for the change that the innovation proposes and it is difficult to say if the innovation poses a relative advantage to the traditional system.

Data Sources. Sources of cost and cost savings information should be identified if possible at the outset of the innovation. By recording the staff time incurred by the innovating organization, governmental entities, and stakeholders during innovation development and implementation, there will be a better estimate of the real costs of innovation.

Costs or Cost Savings of the Innovation. By comparing the pre-innovation baseline costs to the costs during implementation or post-innovation, the practitioner can determine the net change as a result of the innovation. This will allow for mid-course corrections, if necessary, or a determination as to whether the innovation had the desired outcomes.

1. What is the measurement approach that will be used to estimate the costs and cost savings of the innovation? What indicators will be used (*e.g., compliance measures, materials use, numbers of spills, etc.*)?
2. What is the pre-innovation baseline against which costs are measured?
 - a. Costs of compliance
 - b. Cost savings of streamlined permitting systems
 - c. Cost savings of reallocation of personnel
 - d. Other (*e.g., new investments, time to market, competitiveness*)

3. What data sources will be used to measure costs and cost savings?
4. To what extent has the innovation resulted in costs or cost savings?

II. Savings of the Innovation

The innovator will need to estimate cost savings resulting from the innovation in comparison to the cost-savings that would be incurred or generated in the absence of the innovation. For the purposes of innovation cost savings analyses, cost savings are represented as savings in time, personnel, capital, operation and maintenance, transactional costs, and economic activity.

5. What significant **time savings/savings** has your organization derived as a result of the innovation? *(Please describe the key types of time savings you incurred including staff time and contractor savings involved in activities including project development, implementation, monitoring, reporting and record keeping, rule revisions, permit administration, and inspections.)*
6. What **significant cost savings in capital, operation and maintenance of new equipment, operation and maintenance of existing equipment, materials, or energy** has your organization derived as a result of the innovation?
7. What **other savings** (e.g., insurance, worker compensation, creation of jobs etc.) has your organization derived as a result of the innovation?
8. What **significant savings** (including major equipment and operation and maintenance costs) has the **regulated community** derived as a result of the innovation?
9. What **significant savings** have **local communities or other stakeholder groups** derived as a result of the innovation?
10. What **economic activity**, if any, has been generated by implementation of the innovation (e.g., jobs may be created if a brownfields site is redeveloped)?

III. Costs of the Innovation

Costs that are frequently feasible to quantify include compliance costs, government regulatory costs, and transaction costs.³ One type of cost of doing an innovation is that you forgo investing time and resources into a more traditional approach. The five basic categories of cost include:

- Real-resource compliance costs: the costs associated with changing production processes or with purchasing, installing, operating, and maintaining new equipment to comply with the innovation or traditional regulations. The costs can be fixed that require an investment over a period of time or they can be variable as a per unit cost.
- Government or stakeholder costs: any public sector administrative, training, permitting, monitoring, reporting, or enforcement costs associated with the innovation or traditional approach.
- Social costs: costs associated with a rise in price of goods or the decrease in the production of goods and services as a result of the innovation or traditional approach.
- Transitional cost: the costs associated with changes in processes or production due to the innovation or traditional approach—these costs could be a disruption in production or the costs of retiring old equipment and changing to a new technology.

³ Economists assign other kinds of costs such as social welfare losses (i.e., rise in price or a decrease in the output of goods and services as a result of the innovation that raises prices for consumers and may decrease a producer's revenues), transitional costs (i.e., the value of resources that are displaced because of innovation-induced reductions in production), and indirect costs (i.e. the adverse effects the innovation may have on product quality and productivity, or on markets for other goods and services). These types of costs or cost savings are difficult to quantify and generally will not be available to the innovation practitioner.

- Indirect costs: the unintended costs the innovation or traditional approach may have on product quality and productivity, or on markets for other goods and services.

The innovation practitioner should consider each potential cost, however, it is not always necessary or feasible to quantify costs in each category. If real-resource compliance costs are likely to be small, social costs and transitional costs may be insignificant. Similarly, if the resources available for an analysis are limited, it may not be feasible to model indirect costs. The practitioner will want to indicate which costs can be quantified, and which will be addressed qualitatively. An example of a qualitative cost may be changes in organizational management to account for an Environmental Management System. The following questions should be described as the costs in terms of the real-resource compliance costs, social welfare costs, transitional costs, and/or indirect costs.

11. What significant **time costs/investments** has your organization incurred as a result of the innovation? *(Please describe the key types of costs you incurred including staff time and contractor costs involved in activities including project development, implementation, monitoring, reporting and record keeping, rule revisions, permit administration, and inspections.)*
 - a. Costs to the regulator
 - b. Costs to the regulated
 - c. Costs to the local community or other stakeholders
12. What significant **costs/investments in capital, operation and maintenance of new equipment, operation and maintenance of existing equipment, materials, or energy** has your organization incurred as a result of the innovation?
13. What **other significant costs** (e.g., insurance, worker compensation, creation of jobs etc.) has your organization incurred as a result of the innovation?

IV. Relative Cost Advantage

The innovator should look at costs and cost savings of the innovation relative to the system prior to implementing the innovation.

14. If the innovation were more used more widely in the future, how would the **marginal (i.e., per innovation) savings and costs** of the innovation change for **your organization**?
 - a. Regulator
 - b. Regulated
 - c. Local community and other stakeholders
15. What is the **difference** between the innovation costs and baseline costs (i.e., costs associated with current regulatory framework)?

Exhibit 3 is an organizing table that is intended as a model for consideration by the innovation practitioner. It is neither intended to be comprehensive, nor to anticipate every kind of cost associated with an innovation.

Exhibit 3—Costs/Cost Savings Model Table			
Category of Costs	Baseline Costs	Costs of Innovation	Net Change: Costs or Cost Savings
Real-Resource Compliance Costs			
Project Development Costs			
Capital Costs			
Operation and Maintenance Costs			
Government Regulatory Costs			
Permit Review Costs			
Inspection Costs			
Social Costs			
Cost of goods with recycled materials			
Transitional Costs			
Indirect Costs			